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09/671,002	09/27/2000	Brian Dennis McKean	SJ09-2000-0068US1	6634

7590 07/02/2004  
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EXAMINER

BAKER, PAUL A

ART UNIT	PAPER NUMBER
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2188

DATE MAILED: 07/02/2004

23

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/671,002

Applicant(s)

MCKEAN ET AL.

Examiner

Paul A Baker

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 16 April 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) 15 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14, 16-26 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-5,7,14,16-18, 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schultz et al US Patent 6,058,489 in view of Ofer et al. US Patent 5,887,199.

In regards to claim 1, Schultz discloses adding at least one drive to a system controller that controls a predetermined number of storage devices arranged in a digital array storage device to form a system drive in column 2 lines 43-64.

However, Shultz does not disclose the converting data in a first format type on the digital array of storage devices to a format of a second type on the added at least one drive. Ofer discloses a disk array where each drive may have its own block size (format) in column 1 lines 48-58. Ofer discloses the benefits of maintaining a disk array where the disks have different formats as having flexibility and adaptability in column 1 lines 8-15. Since Schultz discloses the rearrangement of stripes of data when adding a drive in Figure 2A-2F, the conversion between formats would be required during this operation when the added disk would be of a different format. The converted data would then be migrated from one disk to the added at least one drive. Therefore it would have

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been obvious to one skilled in the art at the time of invention to add a drive of one format to a disk array of a different format.

In regards to claim 2, Schultz and Ofer disclose the invention substantially as claimed. While neither Schultz nor Ofer explicitly disclose the formatting the drive in the second format type and then adding the drive to the array, it is well known in the art that a drive added to a computer system must be formatted before it can be used.

Therefore, it would have been obvious to one skilled in the art to format the drive before adding it to the disk array.

In regards to claim 3, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the re-laying out data stored on the predetermined number of storage devices arranged in the digital array storage devices forming the system drive using the predetermined number of storage devices and the added first drive formatted in the second format type in Figure 2A-2F. Since Schultz discloses the addition of multiple drives in column 2 lines 51-53, the process shown in Figure 2A-2F could be performed by the addition of another drive as disclosed in claim 3 lines 6 through 9 and has been anticipated by Schultz. Therefore it would have been obvious to one skilled in the art at the time of invention to add another drive and migrate the data of first format type to second format type on the second drive.

In regards to claim 4, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the migration being performed by the system controller using a background process in Figure 5.

In regards to claim 5, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses data writes to both one of the predetermined number of storage devices and the added second drive during the migration performed by the background process in column 2 lines 45 through 49.

In regards to claim 7, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the migrating is performed by the system controller using a regeneration function when one of the predetermined number of storage devices fails before the migration has completed in column 22 lines 37-40.

In regards to claim 9, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the use of RAID 1 in column 2 lines 41-43 this RAID level provides a mirror of each drive, Since Ofer provides the possibility of drives having different formats in a disk array, it would have been obvious at the time of invention to select drives to create a mirror system where the mirror drive is of a second format.

In regards to claim 10, Schultz and Ofer disclose the invention substantially as claimed. In the creation of RAID 1 as disclosed by Schultz, the conversion of one format to another as disclosed by Ofer would be required when the mirror drive is of a different format. Therefore, it would have been obvious at the time of invention to copy data from the predetermined number of storage devices in a first format to the mirror drive in a second format.

In regards to claim 11, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the ability to perform writing to the disk array system during copying in column 2 lines 45-48.

In regards to claim 12, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the removal of a disk from the array in column 2 line 65 column 3 line 1.

In regards to claim 13, Schultz and Ofer disclose the invention substantially as claimed. Ofer further discloses drives with 512 or 520 bytes per sector in column 1 lines 59-62 and by the title "Mass storage controller with universal track size adaptability" indicates any sector (track) size is anticipated.

In regards to claim 14, Schultz discloses a plurality of storage devices forming a system drive formatted in a first format type in Figure 1 element 114E, and a system controller coupled to a plurality of storage devices for controlling the plurality of storage devices forming system drive in Figure 1 element 10. However Schultz does not disclose at least one drive formatted in a second format type, coupled to the system controller, wherein the system controller converts data in a first format type on a plurality of storage devices to a format of a second type on the at least one additional drive. Ofer discloses converting a first format type to another in column 1 lines 48-57. Ofer discloses the benefits of maintaining a disk array where the disks have different formats as having flexibility and adaptability in column 1 lines 8-15. The converted data would then be migrated from one disk to the added at least one drive. Therefore, it would have been obvious at the time of invention to convert data in the first format type to data of a different format on a different drive.

In regards to claim 16, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the re-laying out data stored on the plurality of

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storage devices in Figure 2A-2F. Schultz discloses the addition of one or more drives in column 2 lines 51-53. Ofer discloses the conversion of one format to another in column 1 lines 48-58. In the migration, the conversion between formats would be required during this operation when the added disks would be of a different format. Therefore, it would have been obvious at the time of invention to add one or more drives of another format and migrate the data from the first format to the second format.

In regards to claim 17, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the migration being performed by the system controller using a background process in Figure 5.

In regards to claim 18, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses data writes to both one of the predetermined number of storage devices and the added second drive during the migration performed by the background process in column 2 lines 45 through 49.

In regards to claim 20, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the migrating is performed by the system controller using a regeneration function when one of the predetermined number of storage devices fails before the migration has completed in column 22 lines 37-40.

In regards to claim 22, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the use of RAID 1 in column 2 lines 41-43 this RAID level provides a mirror of each drive, Since Ofer provides the possibility of drives having different formats in a disk array, it would have been obvious at the time of invention to select drives to create a mirror system where the mirror drive is of a second format.

In regards to claim 23, Schultz and Ofer disclose the invention substantially as claimed. In the creation of RAID 1 as disclosed by Schultz, the conversion of one format to another as disclosed by Ofer would be required when the mirror drive is of a different format. Therefore, it would have been obvious at the time of invention to copy data from the predetermined number of storage devices in a first format to the mirror drive in a second format.

In regards to claim 24, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the ability to perform writing to the disk array system during copying in column 2 lines 45-48.

In regards to claim 25, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the removal of a disk from the array in column 2 line 65 column 3 line 1.

In regards to claim 26, Schultz and Ofer disclose the invention substantially as claimed. Ofer further discloses drives with 512 or 520 bytes per sector in column 1 lines 59-62 and by the title "Mass storage controller with universal track size adaptability" indicates any sector (track) size is anticipated.

Claims 6, 8, 19 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schultz in view of Ofer as applied to claims 3, 2, 16 and 15 above, and further in view of Stallmo et al. US Patent 5,875,456.

In regards to claim 6 and 19, Schultz and Ofer disclose the invention substantially as claimed. While neither Schultz nor Ofer disclose the removal of a drive after migration, then the addition of an additional drive of the second format with the



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migration from another drive to the added drive. More specifically neither Schultz nor Ofer disclose the serial operation of migration, removal, addition, and migration. Stallmo discloses the adding and/or deleting of disks from the managed set of disks in column 10 lines 6-11. Since Stallmo specifies the alternate and conjunctive forms he foresaw removal and addition of disks in one general operation in the same field of endeavor of disk array expansion and contraction. Given Stallmo's disclosure of removing and adding disks in a general operation in the context of Schultz and Ofer, it would have been obvious at the time of invention to one skilled in the art to remove a drive after migration with the addition of another drive of the second format and the further migration to the additional drive.

In regards to claims 8 and 21, Schultz and Ofer disclose the invention substantially as claimed. While neither Schultz nor Ofer disclose the removal of a drive, reformatting the drive to a second format then the replacement into the array for reconstitution via regeneration function. In the instance of a soft failure of a drive in the system of a mixed format it would be obvious upon determination that the drive can be reused, to reformat the drive in the second format and add the drive to the array for reconstitution of the drive. Therefore it would have been obvious at the time of the invention to remove the drive, reformat the drive to the second format and reconstitute the drive using RAID parity information.

### ***Response to Arguments***

Applicant's arguments filed 16 April 2004 have been fully considered but they are not persuasive.

When taken in combination, Shultz et al. US Patent 6,058,489 and Ofer et al. US Patent 5,887,199 discloses all of applicants claim limitations for claims 1-5, 7, 14, 16-18 and 20. Shultz discloses migrating the data from the original logical volume to the new logical volume, as shown in column 2 lines 49-59 and figures 2a-2f. Ofer discloses formatting data to be written to a disk to be in the native format of the drive regardless of its block size and format. The combination of the two inventions (ie replacing Shultz's SCSI controllers (figure 1 element 112A-E) with Ofer's storage controller (figure 1 element 12)) results in applicant's invention as claimed in claims 1-5, 7, 14, 16-18 and 20. Shultz's migration of data from one logical volume to a new logical volume would cause Ofer's storage controller to reformat data that is migrated from one disk having a first disk block format to another disk having a second disk block format.

In regards to Stallmo et al. US Patent 5,875,456, (used in combination with Shultz and Ofer to reject claims 6,8,19 and 21) the examiner did not rely on Stallmo to reject the claim limitations covered by the combination of Shultz and Ofer. As to applicant's claim that Stallmo teaches away from applicant's invention, the applicant fails to disclose how applicant's claimed invention differs from Stallmo's disclosure of squares in figure 5. Indeed, examiner asserts that applicant's invention must conform to Stallmo's figure 5 for the following reason: in order for the redundancy in RAID to work, the stripe size must be identical across all disks in the array which participate in the same logical volume (the stripe illustrated by Stallmo in figure 5 is 16 blocks, the square is defined as the equivalent stripe of all disks in the array). This is because for data recovery to occur the XOR of the stripes in the square is performed to reconstruct the

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missing stripe, therefore each stripe *must* be the same logical size. While applicants *physical* block size on each of the disks may be different when compared to Stallmo's uniform physical block size, the *logical* block size (defined as the portions of a disk which comprise a stripe) must be equivalent for the stripes across the disks to of same size or else the attempt to recover lost data within a RAID would produce unpredictable results (this is the reason Stallmo shows in figure 4 that the arrayed disks of dissimilar capacities are divided into different logical volumes (rectangles), trying to create a single volume out of the combination of rectangle 0 and rectangle 1 would prove disastrous for the fault tolerance of the RAID since disk 1 has no data which can be stored in the area defined by rectangle 1). Therefore on the logical level, applicant's claimed invention must conform to Stallmo's figure 5.

Therefore the examiner respectfully maintains his rejection of applicant's claims 1-14 and 16-26.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul A Baker whose telephone number is (703)305-3304. The examiner can normally be reached on M-F 10am-6:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mano Padmanabhan can be reached on (703)306-2903. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



PB

*Reginald G. Bragdon*  
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